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PENSOFT

New records and an updated map of distribution of *Micrurus camilae* Renjifo & Lundberg, 2003 (Elapidae) for Colombia

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Abstract
Camila's Coral Snake, *Micrurus camilae* Renjifo & Lundberg, 2003, is known only by 3 collected specimens. In this work, we report for the first time the presence of *M. camilae* in the middle Magdalena Valley, and we add data about color variation in the species. The new record extends the distributional range of *M. camilae* by nearly 200 km in a straight line from Vereda El Rayo, Tarazá, Antioquia, which is the nearest point previously reported.

Keywords
Chocó-Magdalena province, coral snake, Neotropics, range extension

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Introduction

The term New World coral snakes is used to refer to the American snakes of the genera *Micruroides* Schmidt, 1928 and *Micrurus* Wagler, 1824. These genera form the subfamily Elapinae (sensu Slowinski et al. 2001) based on molecular and morphological characteristics. Of these 2 genera, *Micrurus* currently comprises 86 species (Uetz and Hošek 2019) inhabiting lowland rainforests and deserts to highland cloud forests, between 0 and 3000 m above sea level, from the southern United States through Mexico, Central America, and most of South America to central Argentina (Campbell and Lamar 2004, Silva Jr et al. 2016, Guedes et al. 2018). In Colombia, there are records of 30 species (Uetz and Hošek 2019, Guedes et al. 2018), of which very few aspects are known about their biology, systematics, and distribution. In this work, we present an extension of distribution, and new morphological and ecological data for *Micrurus camilae* Renjifo & Lundberg, 2003 which was until now, known from only 2 specimens of the type series (Renjifo and Lunbberg 2003) and an additional specimen recorded in Tarazá, Antioquia (Alzate 2014).

Methods

Aiming to obtain new records of *M. camilae* in Colombia, we examined the collections of ICN (Instituto de Ciencias Naturales, Universidad Nacional de Colombia) and UIS (Colección de Herpetología, Universidad Industrial de Santander, Bucaramanga, Santander). Literature

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Table 1. Full list of the occurrence localities of *Micrurus camilae* in Colombia, based on literature, museum data, and photographic records.

Specimen	Department	Municipality,Locality	Latitude	Longitude	Elevation (m)	Source
ICN-8506	Córdoba	Tierra Alta, Hidroeléctrica de Urrá I	08.017611	−076.185583	90	Renjifo and Lunbberg 2003
ICN-8507	Córdoba	Tierra Alta, Hidroeléctrica de Urrá I	08.017611	−076.185583	90	Renjifo and Lunbberg 2003
MHUA-R-14894	Antioquia	Tarazá, Vda. El Rayo	07.495638	−075.372868	160	Alzate 2014
UIS-R-4164	Santander	Barrancabermeja, La Lizama	05.6419	−077.0755	143	MHN-UIS
UIS-R-4416	Santander	Betulia, Vda. La Putana, El Cedral	07.122778	−073.455833	176	MHN-UIS
Photo	Santander	Barrancabermeja, Vda. Planta Nueva	06.994144	−073.760125	88	HSE
Photo	Antioquia	Apartadó, Vda. Salsipuedes	07.859975	−076.597900	60	Carlos Bran

Figure 1. *Micrurus camilae*. **A, B.** juvenile female (UIS-R-4164) from La Lizama, Santander. **C.** Photographic record in Apartadó municipality, Antioquia. **D.** Protographic record in Barrancabermeja, Santander. Photos: **A, B**. Elson Meneses-Pelayo. **C**. Carlos Bran. **D**. Grupo manejo de fauna Health Safety and Environment Ltd.

records, museum databases, and photographic records with precise localities were also examined (Table 1). For each preserved specimen of *M. camilae* we recorded (1) the number of black rings, (2) the number of ventral scales, (3) the number of subcaudal scales, (4) the organization of the labial scales, and (5) the total length (Table 2). Species identification was based on literature, taxonomic keys, and with direct comparisons with the type series (Renjifo and Lundberg 2003; Alzate 2014).

Results

New records. Colombia: Santander, Barrancabermeja municipality: La Lizama (05.6419° N, 077.0755° W; 143 m alt.), 1 juvenile female, in an African palm crop, coll. by Rafael Mantilla, 19 June 2005, (UIS-R-4164, Figs 1A, B, 2A). Colombia: Santander, Betulia municipality: El Cedral, Vereda La Putana (07.1228° N, 073.4558° W; 176 m alt.), 1 adult male, in gardens of administrative cen-

ter of ISAGEN, coll. by Diana Caballero, 5 April 2018 (UIS-4416, Fig. 2B). Colombia: Antioquia, Apartadó municipality: surrounding road of the city (07.8600° N, 076.5979° W; 60 m alt.), recorded on 17 July 2018 (Carlos Bran, photographic record, Fig. 1C). Colombia: Santander, Barrancabermeja municipality: Vereda Planta

Table 2. Morphological data of the specimens of *Micrurus camilae* examined in this work. Temporals account for anterior and posterior temporals respectively. For postoculars, a slash (/) is used when the counts from left/right sides are different. Values from examined specimens that expand the hitherto documented variation are in **bold** font.

	Micrurus camilae				
	Renjifo and Lunbberg (2003)		**Alzate (2014)**	**This work**	
	ICN-8506	**ICN-8507**	**MHUA-R-14894**	**UIS-R-4164**	**UIS-R-4416**
Sex	Male	Male	Female	Female	male
TL (mm)	291.8	247	—	240	**630**
Dorsals	15-15-15	15-15-15	15-15-15	15-15-15	15-15-15
Preventrals	—	—	4	4	4
Ventrals	269	—	**303**	**301**	268
Subcaudals	41	—	30	30	40
Supralabials	7	—	7	7	7
Infralabials	7	—	7	7	7
Temporals	1+1	—	1+1	1+1	1+1
Postoculars	2/2	—	2/1	2/2	2/2
Black rings Body-tail	31-4	36-4	**46-5**	**58-5**	**43-5**

Figure 2. Habitat of *Micrurus camilae*. **A.** Palm crops and paddocks where the juvenile female was found (UIS-R-4416) La Lizama, Barrancabermeja, Santander. **B.** Anthropogenic site where the adult male was found (UIS-R-4416) from El Cedral, Betulia, Santander. **C.** Place of photographic record from Barrancabermeja, Santander. Photos: **A.** Diana Caballero. **B.** Elson Meneses-Pelayo. **C.** Grupo manejo de fauna Health Safety and Environment Ltd.

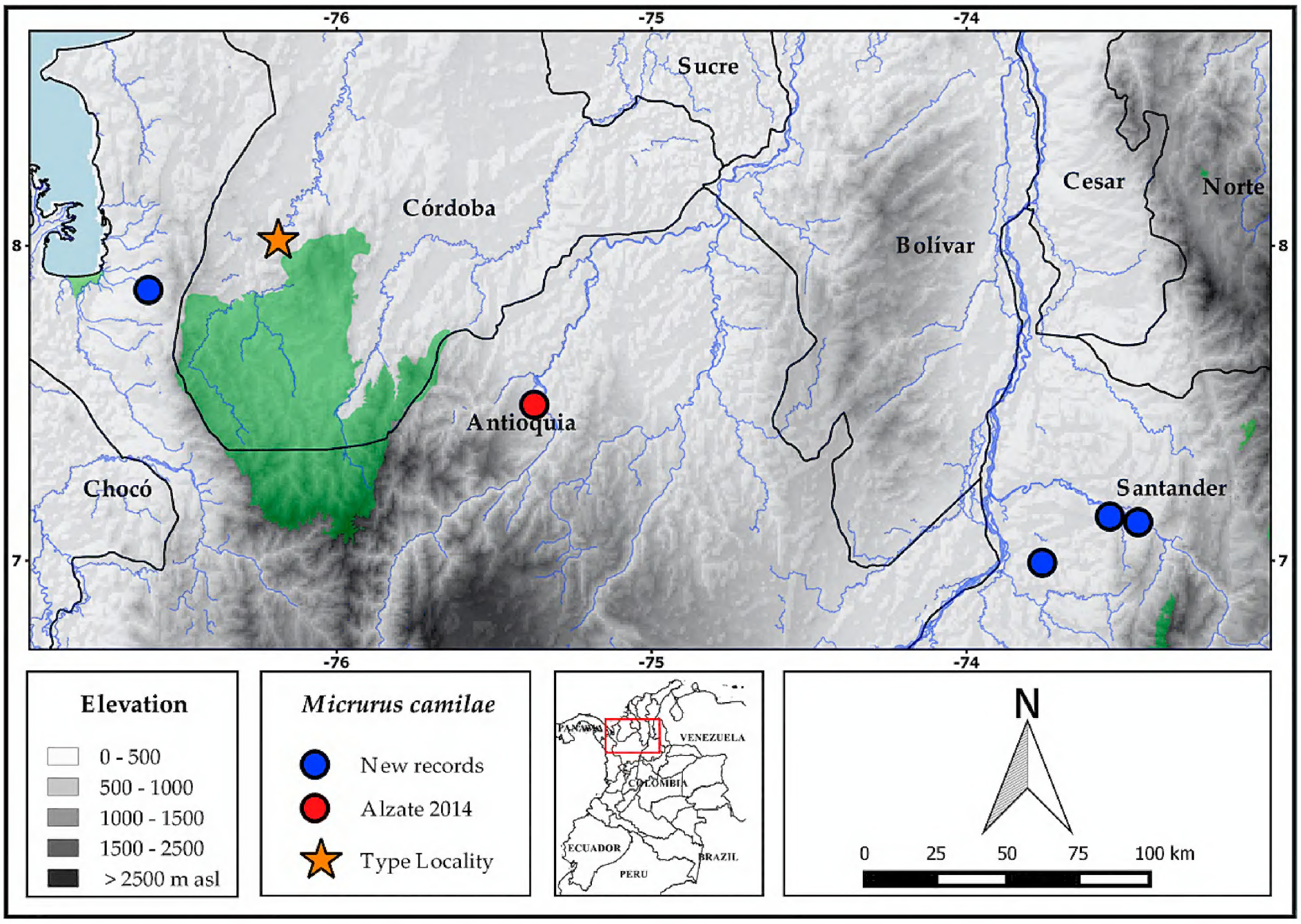

Figure 3. Current distribution of *Micrurus camilae* in Colombia, showing previously known (Red circles and Orange star) and new records (Blue circles). Green polygons are protected areas. Datum: WGS84.

Nueva (06.9941° N, 073.7601° W; 88 m alt.), 2 February 2018 (Grupo manejo de fauna Health Safety and Enviroment Ltd, photographic record, Figs 1D, 2C).

Identification. The photographic record of the individual found in Apartadó (Antioquia) matches the original description in which the coloration of the snout is completely black as far as the fourth supralabial (Fig. 1C). On the other hand, the new populations found in the middle valley of the Magdalena river basin are characterized by their dorsal coloration consisting of 48 to 63 black rings; a red spot on the snout between the prefrontals and internasals; the black plate of the head only covers the first supralabial (Fig. 1B); and ventrals/subcaudals 268/40 (UIS-R-4416, male)-301/30 (UIS-R-4164, female). Different from that reported for the type series in which the black plate of the head covers up to the fourth supralabial, the red spot on the snout is absent and ventrals reported for only one male is 269 (Table 2). With this new evidence, we demonstrate that in this species there is geographic variation and sexual dimorphism in the number of ventral and black bands that was previously unreported.

Discussion

The 4 new records presented in this work expand the knowledge of the distribution of *M. camilae,* which now extends from Urabá region to the middle Magdalena Valley in the ecoregion Magdalena-Urabá moist forest (sensu Olson et al. 2001; Fig. 3), with an elevational distribution between 88 (Vda. Planta Nueva, Barrancabermeja) to 176 (Vda. La Putana, Betulia) m a.s.l. With these new findings we conclude that *M. camilae* inhabits areas with high degrees of anthropogenization and fragmentation. Nonetheless, there are few records made in these areas, which could indicate a low population density. This species was classified in 2013 by the IUCN (Ines Hladki 2016) as being Data Deficient because it was known from only 3 localities and information on distribution, abundance, and trend are incomplete. because the species is known from only three localities; better information is needed on full distribution, abundance, and trend, so more data are needed. The lack of information is due to the difficulty of observing this species in the field because of its fossorial/cryptozoic habits, which may cause an underestimation of its Red List category (Bland and Böhm 2016). However, although we present new records, we still consider that more information is needed to propose a Red List category other than Data Deficient.

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Authors' Contributions

EMP wrote the text, examined the specimens, and prepared the figures and tables; DC collected 1 of the specimens, provided data of habitat, and revised the manuscript.

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